CLAIMS

1. An encoding apparatus for encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

5   input means for inputting images of frames;
section division means for dividing the frames
into a plurality of sections on the basis of the images
of the frames input by said input means;
representative image setting means for setting

10   one representative image that represents the image of
each frame in each of the sections divided by said
section division means; and
reference image selection means for selecting one
representative image to be referred to so as to encode

15   an image of a frame of interest from the representative
images set for respective sections, and
in that the image of the frame of interest is
encoded by motion compensation using the images of the
frames in the section that includes the representative

20   image selected by said reference image selection means.

2. An encoding apparatus for encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

25   input means for inputting images of frames;

section division means for dividing the frames
into a plurality of sections on the basis of the images
of the frames input by said input means;

representative image setting means for setting

5   one representative image that represents the image of
each frame in each of the sections divided by said
section division means; and

reference image selection means for selecting one
representative image to be referred to so as to encode

10   an image of a frame of interest from the representative
images set for respective sections, and

in that the image of the frame of interest is
encoded by motion compensation using the representative
image selected by said reference image selection means.

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3. The apparatus according to claim 1,
characterized in that said section division means
comprises difference determination means for
determining with reference to images of frames in an

20   order said input means inputs whether or not an image
difference between neighboring frames is not less than
a predetermined value, and

when said difference determination means refers
to images in turn from an image of a first frame, and

25   determines that a difference between an image of a
second frame and an image of a third frame as a next
frame of the second frame is not less than the

predetermined value, said difference determination
means sets the first and second frames as one section.

4.   The apparatus according to claim 1,
characterized in that said representative image setting
means sets, as a representative image, an image of a
self frame, which has a smallest sum total value of
differences from a group of images of other frames in
each of the sections divided by said section division
means.

5.   The apparatus according to claim 1,
characterized in that said reference image selection
means calculates prediction errors of motion
compensation with an image of a frame to be encoded for
respective representative images set in the respective
sections, and selects the representative image that
minimizes the prediction error.

6.   The apparatus according to claim 1,
characterized in that the difference is a sum total
value obtained by summing up differences between pixel
values of corresponding pixels in two images for all or
some pixels that form the images.

7.   The apparatus according to claim 1,
characterized in that said section division means
further comprises:

     determination means for determining whether or
5   not a frame of interest is included in a section to
which a frame immediately before the frame of interest
belongs;

     first setting means for, when the frame of
interest is included in the section to which the frame
10   immediately before the frame of interest belongs,
setting the representative frame set in the section or
the frame of interest as a new representative image in
the section on the basis of images of respective frames
in the section and an image of the frame of interest;
15   and

     second setting means for, when the frame of
interest is not included in the section to which the
frame immediately before the frame of interest belongs,
setting a new section which is different from the
20   section and includes the frame of interest.

8.   The apparatus according to claim 7,
characterized in that said determination means
calculates a difference between an image of a last
25   frame of the section to which the frame immediately
before the frame of interest belongs, and the image of
the frame of interest, and when the calculated

difference is not more than a predetermined threshold,
said determination means determines that the frame of
interest is included in the section to which the frame
immediately before the frame of interest belongs.

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9. The apparatus according to claim 7,
characterized in that said first setting means further
comprises:

first calculation means for calculating

10 differences between respective frames in the section,
and the frame of interest, and calculating a sum total
value of the calculated differences;

second calculation means for calculating a
difference between the representative frame set in the

15 section and the image of the frame of interest;

representative frame setting means for, when a
sum of the value calculated by said second calculation
means and a threshold is not less than the sum total
value calculated by said first calculation means,

20 setting the frame of interest as a new representative
frame in the section;

first threshold setting means for, when the sum
value is not less than the sum total value calculated
by said first calculation means, setting the sum total

25 value calculated by said first calculation means as the
threshold; and

second threshold means for, when the sum value is
not more than the sum total value calculated by said
first calculation means, setting the sum value as the
threshold.

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10. An encoding apparatus for encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

input means for inputting images of frames for
10   every predetermined number of frames;

representative image setting means for setting
one representative image that represents images of the
predetermined number of frames on the basis of the
images of the frames for every predetermined number of
15   frames; and

output means for outputting encoded results of
the images of the frames input by said input means
together with information required to specify the
representative image.

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11. A decoding apparatus for decoding an encoded
result of images of frames that form a moving image by
motion compensation, characterized by comprising:

input means for inputting encoded results of
25   images of frames for a predetermined number of frames,
and information required to specify a representative
frame which represents the frames for the predetermined

number of frames, which is appended to each of the
encoded results of the frames; and

storage means for storing a decoded result of the
representative frame specified by the information, and

5   in that the encoded result of an image of each
frame input by said input means after the
representative frame stored in said storage means is
decoded using the decoded result of the representative
frame stored in said storage means.

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12. An encoding apparatus for encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

input means for inputting images of frames;

15   setting means for setting an image of a frame
input at a predetermined cycle of the images of the
frames input by said input means as an image of a
representative frame;

switching means for switching an encoding method

20   depending on whether or not a frame to be encoded is a
representative frame; and

output means for outputting encoded results of
the images of the frames input by said input means
together with information required to specify the

25   representative frame.

13. An encoding apparatus for encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

input means for inputting images of frames for
5   every predetermined number of frames;

calculation means for calculating a difference
between an image of a frame input by said input means
and a decoded image obtained by decoding a result of
encoding the image of the frame;

10   determination means for determining an image of a
frame having a smallest difference of the differences
calculated by said calculation means for the frames for
the predetermined number of frames as a representative
image that represents the images of the frames for the
15 predetermined number of frames; and

output means for outputting encoded results of
the images of the frames input by said input means
together with information required to specify the
representative frame.

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14. An encoding apparatus for encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

input means for inputting images of frames;
25   storage means for storing an image of a
representative frame to be referred to when inter-frame

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encoding is applied to an input image input by said

input means;

calculation means for calculating similarity

levels of images stored in said storage means with the

5   input image;

storage control means for, when a minimum

similarity level of the similarity levels calculated by

said calculation means for the images stored in said

storage means is not less than a predetermined value,

10   storing the input image in said storage means as a

representative frame; and

output means for outputting encoded results of

the images of the frames input by said input means

together with information required to specify the

15   representative image.

15.   An encoding apparatus for encoding images of

frames, which form a moving image by motion

compensation, characterized by comprising:

20   input means for inputting images of frames;

storage means for storing an image of a

representative frame to be referred to when inter-frame

encoding is applied to an input image input by said

input means;

25   motion vector calculation means for calculating

motion vectors with the input image for images stored

in said storage means;

calculation means for calculating errors of the

motion vectors calculated by said motion vector

calculation means for the images stored in said storage

means;

5   storage control means for, when a minimum error

of the errors calculated by said calculation means for

the images stored in said storage means is not more

than a predetermined value, storing the input image in

said storage means as a representative frame; and

10   output means for outputting encoded results of

the images of the frames input by said input means

using the motion vectors together with information

required to specify the representative image.

15   16. An encoding method of encoding images of

frames, which form a moving image by motion

compensation, characterized by comprising:

an input step of inputting images of frames;

a section division step of dividing the frames

20 into a plurality of sections on the basis of the images

of the frames input in the input step;

a representative image setting step of setting

one representative image that represents the image of

each frame in each of the sections divided in the

25 section division step; and

a reference image selection step of selecting one

representative image to be referred to so as to encode

an image of a frame of interest from the representative

images set for respective sections, and

in that the image of the frame of interest is

encoded by motion compensation using the images of the

5   frames in the section that includes the representative

image selected in the reference image selection step.

17.   An encoding method of encoding images of

frames, which form a moving image by motion

10   compensation, characterized by comprising:

an input step of inputting images of frames;

a section division step of dividing the frames

into a plurality of sections on the basis of the images

of the frames input in the input step;

15   a representative image setting step of setting

one representative image that represents the image of

each frame in each of the sections divided in the

section division step; and

a reference image selection step of selecting one

20   representative image to be referred to so as to encode

an image of a frame of interest from the representative

images set for respective sections, and

in that the image of the frame of interest is

encoded by motion compensation using the representative

25   image selected in the reference image selection step.

18. An encoding method of encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

an input step of inputting images of frames for

5   every predetermined number of frames;

a representative image setting step of setting
one representative image that represents images of the
predetermined number of frames on the basis of the
images of the frames for every predetermined number of

10   frames; and

an output step of outputting encoded results of
the images of the frames input in the input step
together with information required to specify the
representative image.

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19. A decoding method of decoding an encoded
result of images of frames that form a moving image by
motion compensation, characterized by comprising:

an input step of inputting encoded results of

20   images of frames for a predetermined number of frames,
and information required to specify a representative
frame which represents the frames for the predetermined
number of frames, which is appended to each of the
encoded results of the frames; and

25   a storage step of storing a decoded result of the
representative frame specified by the information, and

in that the encoded result of an image of each
frame input in the input step after the representative
frame stored in the storage step is decoded using the
decoded result of the representative frame stored in
5   the storage step.

    20.   An encoding method of encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:
10   an input step of inputting images of frames;
         a setting step of setting an image of a frame
input at a predetermined cycle of the images of the
frames input in the input step as an image of a
representative frame;
15   a switching step of switching an encoding method
depending on whether or not a frame to be encoded is a
representative frame; and
         an output step of outputting encoded results of
the images of the frames input in the input step
20   together with information required to specify the
representative frame.

    21.   An encoding method of encoding images of
frames, which form a moving image by motion
25   compensation, characterized by comprising:
         an input step of inputting images of frames for
every predetermined number of frames;

a calculation step of calculating a difference

between an image of a frame input in the input step and

a decoded image obtained by decoding a result of

encoding the image of the frame;

5   a determination step of determining an image of a

frame having a smallest difference of the differences

calculated in the calculation step for the frames for

the predetermined number of frames as a representative

image that represents the images of the frames for the

10   predetermined number of frames; and

an output step of outputting encoded results of

the images of the frames input in the input step

together with information required to specify the

representative frame.

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22.   An encoding method of encoding images of

frames, which form a moving image by motion

compensation, characterized by comprising:

an input step of inputting images of frames;

20   a storage step of storing an image of a

representative frame to be referred to when inter-frame

encoding is applied to an input image input in the

input step;

a calculation step of calculating similarity

25   levels of images stored in the storage step with the

input image;

a storage control step of storing, when a minimum
similarity level of the similarity levels calculated by
the calculation step for the images stored in the
storage step is not less than a predetermined value,

5   the input image in the storage step as a representative
frame; and

an output step of outputting encoded results of
the images of the frames input in the input step
together with information required to specify the

10   representative image.

23.   An encoding method of encoding images of
frames, which form a moving image by motion
compensation, characterized by comprising:

15   an input step of inputting images of frames;
a storage step of storing an image of a
representative frame to be referred to when inter-frame
encoding is applied to an input image input in the
input step;

20   a motion vector calculation step of calculating
motion vectors with the input image for images stored
in the storage step;

a calculation step of calculating errors of the
motion vectors calculated in the motion vector

25   calculation step for the images stored in the storage
step;

a storage control step of storing, when a minimum

error of the errors calculated in the calculation step

for the images stored in the storage step is not more

than a predetermined value, the input image in the

5   storage step as a representative frame; and

an output step of outputting encoded results of

the images of the frames input in the input step using

the motion vectors together with information required

to specify the representative image.

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24.   A program characterized by making a computer

execute an encoding method of claim 16.

25.   A program characterized by making a computer

15   execute a decoding method of claim 19.

26.   A program characterized by making a computer

execute an encoding method of claim 20.

20   27.   A computer-readable storage medium

characterized by storing a program of claim 24.

28.   A computer-readable storage medium

characterized by storing a program of claim 25.

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29.   A computer-readable storage medium

characterized by storing a program of claim 26.